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ABSTRACT

Papers on conservation and preservation which were presented at the 1985 International Federation of Library Associations (IFLA) conference include: (1) "Mass Deacidification at the National Library of Canada" (Joyce M. Banks, National Library of Canada); (2) "The National Preservation Office in the British Library" (David W. G. Clements, The British Library, United Kingdom); (3) "Polyester Encapsulation Using an Ultrasonic Welding Machine" (William Minter, Private Book Conservator, United States); (4) "A Preservation Climate: The Achievement of Environmental Standards for Storage at the Newberry Library" (Bonnie Jo Cullison, The Newberry Library, United States); and (5) "Selecting for Conservation--Selecting for Conversion: Some Practical Recommendations for Policy" (Helmut Bausa, Bavarian State Library, West Germany). (THC)

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IFLA GENERAL CONFERENCE, CHICAGO

Division: Management & Technology

Section: Conservation

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Mass deacidification at the National Library of Canada

by

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IR051325

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Nearly every book printed during the past one hundred years, and more, either is brittle or will become brittle as a result of acid decay.[1] This includes most of the books printed since the Confederation of Canada in 1867, that is, most of our printed heritage as a nation. And, because of atmospheric pollution, a great deal of earlier Canadiana, printed on papers we like to think strong and durable, is also threatened. The responsibility of the National Library of Canada (NLC) is to preserve in original format as much Canadiana[2] as possible. To achieve this, sound preventive conservation program is imperative. The NLC is fortunate to have an operational conservation program based on a new preventive conservation technique — mass deacidification — which has become an essential element in the conservation of Canadiana.

Mass deacidification is regarded primarily as a preventive conservation measure because the stabilization and buffering of book papers while they are new and strong will increase the life of the paper by several times, and should minimize future restoration needs. Mass deacidification cannot restore strength to weakened papers; fold strength is the same before and after treatment. This is not meant to suggest that retrospective holdings should be excluded from a mass deacidification program, but rather to emphasize the necessity of giving new materials priority over old.

The Wei T'o Nonaqueous Book Deacidification System, or simply the Wei T'o System, invented by Richard D. Smith, built in Canada and developed by the Public Archives of Canada, became operational in December 1981. The system works as follows:

> Books chosen for mass deacidification are placed in wire baskets and dried for 36 hours in a vacuum dryer. This removes the normal dampness of paper. Two baskets, containing between twenty and thirty books, are then loaded into the process tank. Deacidification solution is then pumped in, and pressure is then increased to ensure complete penetration. Vacuum drying then removes the solvent (which is recovered for reuse). Warm air is introduced at the end of the cycle, pressure is returned to atmospheric level, and the books are removed.
>
> The deacidification cycle lasts approximately one hour. The baskets are placed in plain corrugated boxes, where the books return to room temperature and regain normal moisture from the air. They are inspected and returned [or sent] to their respective divisions. A newly deacidified book does not undergo any change in appearance.[3]

Each book is identified as treated by a small numerical stamp on the verso of its title-page.

The NLC has found that the Wei T'o System is effective, economical and efficient. The pH levels achieved range from 8.5 to 9.5 (7 being neutral). Deacidification is inexpensive at $3.50 US or $4.50 CAN per book. Current routines are simple because the safety of the system makes possible an in-house program. Nothing is held in the Mass Deacidification Unit for more than one week. During that period, the books are delivered, examined and prepared for treatment, dried, deacidified, reacclimatized, inspected, identified as treated and sent to the stacks.

The present system does have a few limitations, which means that some pre-selection is necessary. The process tank currently in use is that of the original pilot project, built on a modest scale for the sake of economy. It will only accommodate books up to 10" x 8 1/2" in size. This is the present system's greatest disadvantage. However, the Public Archives of Canada is considering a proposal for the construction of a second, larger process tank. The deacidification agent will not harm leathers, and leatherbound books from the general retrospective collection are routinely sent for treatment, but new leatherbound books and leatherbound books from the Rare Book Collection are not. There is no visible detrimental effect on leathers, but the books must be dried, which could have a permanent adverse effect. Until laboratory tests are completed, this policy will continue. Some coloured illustrations must be masked with blotters to prevent the off-setting of colours, a technique also used to keep library stamps from causing damage. Testing has shown that some plastics used on paperbound books react to the Wei T'o System. On the positive side, testing has proven that the strength of PVA bound paperbacks is enhanced by treatment in the Wei T'o System. With all the limitations mentioned, we have found that one fifth to one quarter of the materials received cannot be treated. This is mainly because of size. When the new, larger process tank is operational, there will be little that we cannot treat in the Wei T'o System. At the same time, we continue to gather data on all physical aspects of library materials.

Practical experience has demonstrated that the present system could deacidify about 3000 books each week, or about 150,000 a year, the average book being one inch thick. However, we have not yet been able to operate the system to its full capacity, i.e. 24 hour a day, seven days a week. Currently, it runs for one shift

a day, five days a week, and can deacidify about 40,000 books a year. An expansion to two shifts is planned for the present fiscal year. The existing capacity of the system will serve the NLC's needs for the treatment of new Canadiana. Last year we received on legal deposit some 13,900 monographs, i.e. 27,800 items, and about 74,500 new Canadian official publications were also added to the collection. For computational purposes, five official publications equal one inch on an average.

The NLC has given Canadiana priority in its mass deacidification program, with new Canadiana taking precedence over retrospective materials. To the end of the 1984/85 fiscal year, however, the program was limited to the deacidification of retrospective holdings from the Canadian Official Publications Collection. Some 35,000 items were treated. (More than 7,000 monographs from the Library of the Public Archives of Canada were also treated.) The focus on older NLC materials was due to problems with the spine label formerly used. Official publications are not labelled in the NLC collections. An aluminium-backed, pressure-sensitive label compatible with the system is now in use. Since the beginning of the current fiscal year in April, the program to treat legal deposit materials and new Canadian official publications began in earnest, but retrospective materials are still sent to ensure that the system is never idle. Such materials are retrieved en bloc, size being the only factor considered. As the capacity of the system expands, the NLC plans a systematic on-going program for the treatment of the retrospective collection, including non-Canadian materials. Since the entire collection comprises some five million items, we expect this program to continue for many years.

Operational results with the Wei T'o System have exceeded our expectations. pH levels are excellent, and anticipated problems with the discolouration of paper did not develop. The system has proven to be a reliable preventive conservation tool and a remarkable breakthrough in conservation technology. It is a credit to Richard D. Smith, the Public Archives of Canada, and a blessing to the NLC.

[1] Permanence/durability of the book---V. Strength and other characteristics of book papers, 1800-1899 (Richmond, VA: W.J. Barrow Research Laboratory, 1967): 17.

[2] Canadiana includes all books printed in Canada, and all books by Canadians or about Canada printed abroad.

[3] National Library news / Nouvelles de la Bibliothèque nationale 14, 3-4 (March/mars--April/avril 1982): 2.

IFLA GENERAL CONFERENCE, CHICAGO

Division: MANAGEMENT AND TECHNOLOGY

Section: CONSERVATION

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THE NATIONAL PRESERVATION OFFICE IN THE BRITISH LIBRARY

by

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THE NATIONAL PRESERVATION OFFICE AT THE BRITISH LIBRARY

by D W G Clements

ABSTRACT

The National Preservation Office was established in November 1984 within the British Library in response to a report on conservation practices in UK Libraries to promote awareness of preservation issues, provide information and referral services, initiate debate on national issues and encourage co-operative initiatives. The article outlines the progress made by the Officein its first year together with its plans for the future and describes activities which have been or are being undertaken by other parts of the British Library in support of preservation efforts nationally.

THE NATIONAL PRESERVATION OFFICE AT THE BRITISH LIBRARY

Introduction

1. Between May, 1982 and September 1983 the British Library Research and Development Department funded a project at Cambridge University under the direction of Dr F Ratcliffe to look at conservation and preservation practices and training needs in British libraries. The report "Preservation Policies and Conservation in British Libraries" Library and Information Report No. 25, 1984 highlighted the lack, on a national basis, of preservation expertise, training facilities, earmarked funds, co-ordination among libraries and use of new preservation technologies. Initiatives were recommended that (i) could be taken locally, (ii) need some element of co-operative activity, and (iii) at the national level proposed the creation of a national advisory and research centre.

2. As part of the response to the report the British Library proposed, after consultation with the library community, to establish a National Preservation Office that would be located within the British Library's Preservation Service and would be supported by an independent committee of experts. The aims of the National Preservation Office were submitted to the British Library Board and were agreed as follows :-

(a) promotion of awareness of pressing conservation problems and the need for good practices

(b) provision of information and referral services on preservation issues

(c) investigation and initiation of debate on important national developments

(d) encouragement of co-operative initiatives

The role of the advisory committee was to support the work of the Office in meeting these aims and objectives and to promote debate on developments of importance in the field of preservation.

British Library Activities in Support of Preservation

3. Both before the decision to establish a National Preservation Office as well as since, the British Library has been engaged in a number of activities in support of preservation efforts nationally. These include the following :-

(a) A report prepared by Dr Stam, New York Public Library entitled "National Preservation Planning in the United Kingdom; An American Perspective" (BLR&D Department Report No. 5759, 1983) provided an overview of preservation problems, commented on technical issues and matters of principle, and on the prerequisities of a national preservation programme.

(b) A grant was awarded to Camberwell School of Art and Crafts to look at disaster control planning in the UK with the aim to provide libraries and archives with appropriate information and training to enable correct precautions and action to be taken to conserve objects in the event of a disaster.

(c) Under section 1(3)(b) of the British Library Act 1972 the British Library Board may contribute to the expenses of other library authorities. In the first ten years of its existence the British Library had awarded 238 grants over 40% of which were for conservation projects.

(d) A report prepared by G Bradley on "The use of acid free paper in the UK for Books and Journals" was funded by the BNB Research Fund.

(e) The Preservation Service of the British Library has funded several projects on technical conservation problems and has produced a video programme on preservation issues to improve awareness and serve in general educational programmes. A newsletter, "Library Conservation News" is also produced.

(f) In the newspaper field a Newsplan programme was established in 1982 to assist other libraries on a regional basis in the co-ordination of newspaper microfilming programmes. The Library also provides grants to other institutions for microfilming retrospective files of newspapers not held in the British Library.

(g) The Library has funded the development of an overhead photo-copier.

The National Preservation Office

4. The National Preservation Office was established in November 1984 with Miss Jane Carr as the National Preservation Officer. The independent Advisory Committee is chaired by Dr Ratcliffe and includes representatives from the national and copyright libraries in the UK, from the Library and Information Services Councils, from the Public Record Office and the Society of Archivists, from SCONUL (Standing Conference of National and University Libraries) from the Library Association, representatives of library schools, public libraries, private libraries, those involved in teaching conservation and from the University Grants Committee. The intention is that meetings of the Advisory Committee will be held twice a year but that a continuing dialogue between Committee members and the Office will be maintained as essential to the effective functioning of the Office at national and regional levels. In the long term it is even possible that the work of the Committee could lead to the establishment of a National Preservation Council.

5. Whilst considering the question of representation, it should perhaps be noted that the Committee does not at present include a practising conservator. At the first meeting of the full Committee in November 1984 it was suggested that conservators might be approached to present papers on specific issues at each succeeding meeting. Since then, it has also been agreed that an informal 'panel' of practising conservators be established to assist the Office in the provision of information and advice.

6. The priorities for debate and action for both Committee and Office were identified at the November 1984 meeting and relate directly to the issues raised at meetings and in papers over the past 4-5 years including the Cambridge conservation conference in 1980, the Ratcliffe report on the Cambridge Conservation project (1982/83), the 1983 Stam report, at the Library and Information Services Council seminar in 1983 and the preservation section of report of the SCONUL council meeting in February, 1984.

7. Without indicating any particular order, these priorities were identified in general terms as :-

(a) a need to promote general awareness of preservation problems

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in the library community as a whole and, by so doing, to stimulate action at both the policy-making and the practical levels (in the ordering of priorities and in the recognition of increased expenditure or the diversion of funds from other budget heads)

(b) a need to provide an information and advisory service to further encourage action, to promote the need for the adoption of good practices, and to allow for the better distribution of scarce resources in the fields of technical support and conservation management techniques

(c) a need to investigate and initiate debate on key national and international issues such as

- a national approach to collection development and retention concentrating on the need for the introduction of surveying with a view to identifying material for retention, and therefore for conservation, at both local and regional levels
- microfilming and substitution and the possibilities for co-operative initiatives in this area (on the lines of the Newsplan programme)
- education and training both for practicing librarians and to redress the lack of technical expertise and resources in binderies and conservation workshops
- acid-free paper
- the need for a co-ordinated approach to scientific and technical research
- contingency planning

(d) a need to encourage and, where appropriate, assist in the development of co-operative initiatives, for example

- local or regional training
- local or regional advisory centres, focussing particularly on the national libraries in the UK and their already established role in this area
- bulk purchasing of conservation materials
- co-operative approaches to acquisition, substitution and retention

(e) a need further to investigate the possibilities for national or regional co-operation in such areas as mass de-acidification; national microfilming projects including the establishing of a National Register of Microfilm Masters; new technological approaches to compact storage (for example, the optical disc); the possibilities of co-operative storage of non-book media; improved techniques for photocopying and reprography in general; the development of standards for materials and storage.

(f) a need to investigate additional sources of funding for national projects.

General Awareness

8. Raising the general level of awareness is, inevitably, a slow process but since 1980, there is real evidence of a changing view - to the point now reached when preservation has become 'fashionable' and even threatens the supremacy of new technology at certain levels of discussion. For example, at a recent meeting of practising conservators - the ostensible purpose of the meeting was to discuss the basis on which an accredited directory of conservators might be compiled - while there was difficulty on reaching agreement on accreditation or the compilation of the directory all agreed that the very fact that they were able seriously to discuss the possibility of an accredited register indicated the level of change in attitude over the last five years, and the conservators own sense of the need to set standards and to establish some kind of formal 'professional' base.

9. Equally, as the National Preservation Officer now begins to visit libraries and discuss preservation problems with them, it is clear from the very positive welcome that a climate of concern has already been created. What is also clear, however, is that information, education and resources (management and technical skills, staff, materials and workshop facilities as well as funds) are needed urgently if this climate of concern is to be converted into positive policy and planning at national, regional and local levels.

10. As the first steps towards meeting these basic needs a series of 'Preservation Guidelines' has been devised (in some respect similar to those produced by the Library of Congress National Preservation Program Office) and will be combined, eventually, into basic instructional manuals.

11. The first of these - five current bibliographies on general issues, policy, paper, binding and disaster planning - will appear soon and will be available on request (with a small charge to cover production costs and postage). The National Preservation Advisory Committee has agreed the subjects for a continuing series to appear at regular intervals throughout this and coming years, the first of which will be 'Basic care and handling' and 'Surveying techniques' (both should be available by early summer). Further subjects include

- simple steps to ease preservation problems in the library (self help)
- models of conservation policy statements
- disaster control planning
- binding specifications
- photocopying and preservation
- microforms - standards for production and storage
- the importance of environmental control
- substitution
- conservation of photographs and other non-book materials

In addition to the Guideline on Care and Handling, a book mark is is also being designed to carry simple messages to be supplied in bulk to libraries for use by readers.

12. Portable exhibition equipment has also been obtained by the National Preservation Office and display panels are being designed. The equipment and displays will be used in two ways; firstly for small displays within individual libraries, at local exhibitions or trade fairs, or to accompany regional seminars; secondly for displays on specific subjects at national events.

Information Service

13. Although the main activities of the Office have initially been in the areas of information gathering, visits, promotion of awareness and planning, there is a growth beginning of enquiries. In most cases the enquiries are relatively simple to handle, requiring only brief searches of existing information or referral to a source of immediate and reliable technical advice or assistance. A few of the enquiries have required detail searching of literature files combined with consultation with practicing conservators. The detailed information gained from thorough responses to such enquiries is expected to be an advantage in handling an increased volume of requests for information and advice in the future and it has been agreed that the Office should provide an information and advisory service to the library community as a whole.

14. An automated information system is being developed, to operate through the National Preservation Office and through the existing national library and regional groups. The system will be established on an Apricot micro-computer, a choice which was dictated by the knowledge (a) that Apricots were in use in both the National Library of Scotland and the National Library of Wales and that national networking is therefore a strong possibility for the future and (b) because local networking with micros widely used within the British Library will allow access to present and future British Library Preservation Service data bases.

15. The first files to be offered publicly will be

a) - Current bibliographies, including journal articles and, if possible, unpublished research it is not, at present, envisaged that the service will extend to AATA since both the British Museum literature data base and ICCROM in Rome can provide reasonably priced document delivery service or tapes,and ICCROM already provides an annual subject index which includes a number of headings relevant to a librarians' needs

b) Manufacturers/suppliers and materials These lists are being compiled from those held in conservation workshops throughout the UK and from existing published sources; alongside the automated listing, the National Preservation Office will hold a central file of catalogues/stock lists for additional reference; the list will include sources for such facilities as freeze drying; it will include materials for library/archive applications only and will act as a supplement to existing or planned museum or archive lists.

(c) Conservators This will be a list by area of practising conservators, whether private or institutional;it is intended only to provide local sources of advice and help and is not intended to be a register or provide any form of accreditation; it may be possible to work with other UK bodies and/or Craft Council in collecting the data; publishing a directory is not the present intention but rather to direct enquiries towards local expertise/advice.

(d) Courses, seminars and any other short or long term conservation-related education programmes. This file will be developed in order to provide quick responses to individual enquiries, and to allow the Office to investigate and advise on current gaps in training programmes or areas for future development; it will also allow the Office to identify needs for regional training programmes.

(e) A register for museum conservation is being developed by the Museum Documentation Association. It could be worth developing a similar central file for library conservation work on major items should the MDA results prove encouraging.

16. Hard copy output will be available and the daisy wheel printer has been selected to provide reasonable quality output. Brief local searches will not at this stage be subject to a charge but requests requiring large scale effort will be subject to charges.

17. In addition to hard copy output from the files, the Office will attempt to provide a reference service for information unavailable from other sources, for example of published and unpublished material on preservation policy issues or research.

Such documents will only be issued at the discretion of the author/s and, wherever possible, the Office will refer requests to alternative existing sources (the LA Library, the British Library Lending Division, the British Museum Conservation Library etc).

18. The Office will also seek to establish and maintain links with other national or international centres, such as ICCROM, the Library of Congress, the Getty conservation Documentation Centre, the regional centres in the US and other European centres. Where possible and appropriate exchanges of information will be arranged with such centres with particular emphasis on national policy matters and on major research projects.

Educational Activities

19. In many cases, awareness, information and education are indistinguishable as subjects. This is certainly the case with a trial programme of conservation workshops which has been planned to support regional co-operative activities and is aimed at those at middle management level with little practical knowledge of conservation techniques. The intention is to hold two or three trial workshops a year. Each will be located in or adjacent to, a conservation workshop and time will be split almost equally between practical demonstration and discussion with practicing conservators and it is hoped that the archivists will support the initiative and provide practical advice. The outline programme will be on the following lines :-

Introduction

Preservation Policy and Planning

- re-ordering priorities
- surveying collections
- decision making on retention
- co-operation

Practical in-house procedures

- basic care and handling (training for staff and readers)
- housekeeping and environmental control
- book binding standards and specifications
- storage and treatment of non-book materials

History of the book and book structures

Practical techniques

- leather treatment
- paper repair
- 'library' binding
- 'consérvation' binding
- fumigation

20. The workshops are seen as the regional and co-operative extension of a national campaign to improve and expand educational facilities. The National Preservation Advisory Committee, at its first meeting, identified - as has SCONUL, the Library Association, and many others - the urgency of the need to expand the very small core of skilled practitioners, both at technical and management levels. The survey of national libraries in 1982 carried out on behalf of the Council of Directors of National Libraries showed a world-wide core of only a few hundred skilled conservators.

21. The Committee and Office is further involved in the debate with the UK library schools over the inclusion of conservation in the syllabus and indeed a state of the art paper from the Association of British Library and Information Science Schools (ABLISS) was discussed at the May meeting of the Advisory Committee.

National Issues

22. This is inevitably a wide ranging area where the National Preservation Office has a broad interest and must be careful to concentrate its efforts where it can hope to make some progress and/or impact.

23. The early stages of the campaign for use of permanent (acid free) paper for books of worth do not appear to have met with the same success that has been achieved in the United States where a standard has now been published. As a major market for the publishing industry, libraries could help the work of the Publishers Association's Production Committee by defining the kinds of material for which permanent paper would be appropriate, and by making public to the publishing, printing and paper industries the urgency of the need. The National Preservation Office is assisting the Publishers Association in a comparative pH testing survey - in collaboration with the Library of Congress - on a small group of books. An exhibition to support the use of permanent paper will be mounted at the BL's Book Design exhibition later in the year and will be shown at other publishing book fairs.

24. The BL has started work on a register of microform masters and it is hoped that the National Preservation Office will be able to assist in the process of developing this into a national register in a co-ordinating and, possibly, fund-seeking role.

25. The British Library is also supporting a research project into the possibility of mass strengthening of paper by the deposition of polymer fibres within the structure of the paper. Whilst funding for research has been provided by the British Library, the capital expenditure required to establish a mass treatment centre for this - or other national projects - may have to come from the library community as a whole or from alternative commercial sources. If the project develops to the stage where funding issues need to be discussed on a wider scale undoubtedly the National Preservation Advisory Committee would be one forum in which the problems would be considered.

26. The extension of the debate on such major issues will it is hoped be furthered by the recent proposal to organise anually, a two-day seminar on a major policy issue as a way of concentrating effort and trying to accelerate progress in achieving improvements.

Conclusions

27. The National Preservation Office is therefore seen as a new and positive step in promoting the needs of preservation in the United Kingdom and providing an independent forum through its Advisory Committee that can work closely with the British Library Preservation Service. The office's role as information provider and focus is seen initially as an enabling and supporting role to initiatives within the UK but its establishment is however, only the first step towards a co-ordinated national programme, towards increased awareness and towards increased resources at all levels.

D W G Clements
The Preservation Service
The British Library

May 1985

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1985

Division:

Section: JOINED MEETING OF CONSERVATION AND SCIENCE AND TECHNOLOGY

100- CONS-3 / SCIE-6 - E

Polyester Encapsulation Using an Ultrasonic Welding Machine

by

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POLYESTER ENCAPSULATION USING AN ULTRASONIC WELDING MACHINE

Conservators recognize the use of polyester film for encapsulating valuable and/or fragile documents. There exist several different techniques for sealing the edges of polyester film. Ultrasonic welding represents the newest of these techniques. Currently, libraries, archives, and conservation laboratories use ultrasonic welding for encapsulating book leaves, documents, and maps. The paper describes the ultrasonic welder and sealing techniques. Also, it discusses the importance of using the correct type of polyester film which meets the specifications of modern paper conservation.

POLYESTER ENCAPSULATION USING AN ULTRASONIC WELDING MACHINE

The use of polyester film for encapsulating valuable and/or fragile documents has become widely accepted by librarians and conservators in many countries, especially in the United States. The edges of the two sheets of film have been sealed in various ways. Sewing thread and double-sided tape are two techniques that have been used. Demand and new technology have inspired the development of efficient machines that not only save time, but also provide a safer seal. Protection of the document is the primary concern.

Certain plastic films do not have the desirable qualities of polyester. For example, acetate films will react with certain inks causing them to stick. Polyester film, however, is chemically inert. It will not react with the paper or ink; it will not yellow nor become brittle with age. Other important properties, such as the absence of plasticisers and ultraviolet inhibitors are spelled out in the United States government specifications L-P-00670B(2) "Protector, Document" and L-P-377B "Plastic Sheet and Strip, Polyester." We can not overemphasize the importance of knowing the quality and type of polyester film that is being used for conservation.

Sealing the polyester around the document was first accomplished by using thread and a sewing machine. Further testing by the Library of Congress in the early 1970's not only determined the specifications for polyester, but also standardized the use of double-sided tape for sealing the edges. But

this technique is very time consuming, and not necessarily the best for the document. For example, documents can slip and come in contact with the tape. Other disadvantages of its use are that the tape will attract dust and dirt, and become cloudy and unattractive.

With today's technology, there are two other ways to seal polyester: electro-magnetic radiation and ultrasonic welding.

Electro-magnetic radiation utilizes heat to fuse the edges of two pieces of film. This technique has certain limitations. It produces a bulky weld, and limits welding to the edges of the film.

The ultrasonic welding technique eliminates these problems. The ultrasonic weld is small, unobtrusive, and smooth. It seals documents in neat and attractive capsules. The encapsulated documents lie completely flat for efficient storage. The ultrasonic welder allows smaller documents to be encapsulated in a larger format. It also allows the conservator the option of leaving a polyester stub for binding purposes.

Ultrasonic welding represents a time efficient encapsulation technique. For example, the ultrasonic welder encapsulates an 8 1/2 x 11 inch document in less than two minutes. Another method, double-sided tape, takes five or six minutes to seal a document of the same size.

The machine that utilizes ultrasonics for encapsulation was developed and is manufactured in Chicago by William Minter and Peter Malosh. It was

designed six years ago primarily for the encapsulation of book leaves and archival documents. Over thirty of these machines are now in use in the United States, Canada, and England. Major institutions such as the Library of Congress, the National Archives, and the Smithsonian Institution use the ultrasonic welder. Conservation laboratories, archives, and several commercial bookbinders also use the ultrasonic welder. A smaller, more economical model is under development.

Users of the ultrasonic welder continue to develop new ultrasonic welding applications. Valuable maps, posters, archives, and historical documents have been safely preserved using this machine. Rare and brittle books have been taken apart, sealed in polyester leaf by leaf, and then rebound, now carefully preserved and easily accessed.

The ultrasonic welder uses friction to fuse pieces of plastic together, similar to systems used in the plastics industry for parts assembly for over twenty years. A generator in the welder increases standard electrical current at 50/60 cycles per second to 40,000 cycles per second. This electrical impulse is converted into a mechanical vibration. The vibration is transferred through the tip of a horn situated opposite an anvil. Two sheets of polyester are placed between the horn and anvil. The horn welds the two sheets of polyester with a vibrating or hammering action.

The horn is transported along a shaft by a variable speed reversible motor which is controlled by a foot switch. This switch gives the operator complete control of the machine. A magnetic rubber blanket holds the

polyester and document to a stainless steel work surface during the welding operation. This blanket also eliminates any trapped air.

The current machine is 25 by 47 by 12 inches overall, with a main work surface of 15 by 47 inches. Two auxiliary tables permit the encapsulation of documents up to 38 inches square. (Note: Larger documents can be encapsulated by simply repositioning the material). A weld can be produced at any point within 38 inches square. This feature is important when working with fragmented documents. A free form weld can be made with the newest ultrasonic welder: welding an irregular shape around a document.

The ultrasonic welder can easily weld 2, 3, or 4 mil polyester: ICI Melinex 516 or Dupont Mylar Type D, two of the films recommended for conservation. For larger documents that require additional support, a sheet of 2 or 3 mil polyester can be welded to a sheet of 5, 7, or 9 mil.

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A Preservation Climate: The Achievement of Environmental Standards for Storage at the Newberry Library

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A B S T R A C T

A Preservation Climate: the Achievement of Environmental Standards for Storage at the Newberry Library

In 1982, the Newberry Library, an independent research library in Chicago, Illinois, constructed a new building to house its collections. The building is a storage facility and does not contain people functions. Because of this functional limitation it was possible to design a building to economically maintain environmental standards recommended by Paul Banks, Conservator of the Newberry Library at that time. The paper describes how the building's design enables the Library to maintain a controlled environment conducive to prolonging the life of library materials while maximizing their security by limiting access and reducing the risk of damage caused by fire and water. A building automation system monitors all building systems to ensure continuous maintenance of the established environmental standards.

The Newberry Library is a privately endowed, independent research library in Chicago, Illinois. Its collections embrace Western Civilization from the late Middle Ages to the end of the Napoleonic era in Europe and Great Britain; from the era of discovery to the age of revolution in Latin America; and to modern times in North America. It consists of some 1.4 million volumes, 5 million manuscripts and 80,000 maps. Four major research centers within the Library offer fellowships, conferences and seminars to scholars from around the world.

Throughout its history, the Newberry Library has taken special precautions to preserve its collections. It has operated its own in-house bindery for the past 98 years. In the 1930's the open-shelf stack arrangement was changed to a closed-stack arrangement. Between 1959 and 1962, air-conditioning and fire-proofing were installed to better protect the collections. And, in 1964, the President and Librarian, Lawrence W. Towner, appointed Paul Banks the first Conservator of the Newberry Library. Under Banks' leadership the Newberry's conservation program became an example for others to follow. Thus, it was only natural that the Library placed preservation at the top of its priority list when it began planning a new addition to provide much needed stack space.

Planning for the construction of a building to house the collections of the Newberry Library began in 1970 although actual construction was postponed until 1980. The Library staff took advantage of the intervening ten years to produce a series of Planning Reports which

addressed virtually every issue that required consideration to ensure a design that would meet in form and function the Newberry's needs. In Planning Report #7 Paul Banks presented the environmental standards which were to be achieved in the new building.[1] (An adaptation of these appeared in Banks' article "Environmental Standards for Books and Manuscripts," in the LIBRARY JOURNAL, February 1, 1974, pp. 339-343).

It was agreed that the building would be a storage facility to house library materials exclusively and not to accommodate any staff support functions except, of course, paging and shelving. This decision to separate books from people was based on the principle that what is good for people does not prolong the life of books. By restricting the building's function to storage, the parameters specified for temperature and relative humidity (RH) could be tighter and could be tailored more closely to the preservation needs of library materials than the comfort of people. In other words, the temperature could be kept much cooler, slowing the rate of deterioration of the library's materials, and the fluctuation of both temperature and RH could be greatly reduced.

The major constraint in establishing the temperature level then became the environmental differential that would exist between the storage facility and the reading rooms in which the materials would be used. A specific concern was the possible formation of condensation on the surface of a book stored at a low temperature as it was brought into a much warmer room. For example, a standard psychometric chart reveals

that to avoid condensation on its surface the lowest possible cold storage temperature for a book would be 59°F (15°C) if it were to be taken into a room with a RH of 58% and a temperature of 74°F (23°C).[2]

Also considered were the unknown consequences to bound materials as their diverse components responded rapidly to the abrupt change in environment and were simultaneously flexed during use. It was Banks' contention, however, that the benefits of cold storage for all of the library materials outweighed the deleterious effects on the smaller percentage of items paged for use.

With these factors in mind, temperature parameters were specified at 60°F (15.5°C) plus or minus (±) 5°. Thus, the acceptable range of fluctuation was 55°F - 65°F (13°C-18°C). The relative humidity specified was 50% with a diurnal allowable fluctuation of ±3% and a seasonal allowable fluctuation of ±6%. The RH specification of 50% was an attempt to balance conflicting consequences of humidity: on the one hand, increased moisture content increases the rate of deteriorating chemical reactions, while on the other, low relative humidity can reduce the flexibility of paper and cause dessication and embrittlement of other book components. Recognizing, however, that future research may produce more concrete evidence of the effects of relative humidity on library materials the program requirements for the building called for a system which could be adapted to maintain a RH level of 40% ±5% should that prove desirable in the future.

To achieve and maintain these temperature and RH levels, the

architects (Harry Weese and Associates) designed a 10-story, windowless building with no vertical penetration between floors, much like 10 building blocks stacked one on top of another. The building is attached to the original library by a service link. All plumbing and electrical risers are located in this link, as are the elevators and a stairwell.

The walls of the building are a plenum construction likening it to a large thermos bottle. They consist of 4 inches of brick facing, 2½ inches of polystyrene insulation, 1 inch of air space, 8 inches of solid concrete block, 2 coats of vapor barrier paint, an 8 inch air space which serves as the air return for the building, 3½ inch metal studs, and a 5/8 inch gypsum dry wall. This plenum construction with the return air system acting as a buffer between the external and internal environments has proved to be effective in limiting the influence of outside temperatures and RH on the internal environment making it economically feasible to maintain the specified standards.[3] Moreover, it has eliminated structural damage to the building caused by the formation of condensation on the internal walls as a result of the relatively high humidity levels maintained during Chicago's intensely cold winters.

Ventilation for all levels of the Bookstack building is supplied by two forced air fan units. However, each level has its own reheat and steam humidification capability controlled by a thermostat and a humidistat on each level, so that "fine tuning" of the temperature and

RH can occur independently as the air enters each level. To eliminate stagnant air pockets, air ducts and return air vents were configured with shelf and aisle arrangements in mind to provide thorough circulation of air throughout each floor.

Air cleanliness was another major consideration in the design of the building. Banks' environmental standards limit the levels of sulfur dioxide and oxides of nitrogen to 10 micrograms per cubic meter (m^3). The ozone level is not to exceed 2 micrograms/m^3. The mechanism recommended to achieve clean air standards was a three-stage filtration system: an initial particle filter (non-woven cotton "bag" type), a second stage chemisorbant filter (Purafil) of pelletized activated alumina impregnated with potassium permanganate, chemically oxidizing gases; and a final high efficiency (90-95 percent by the ASHRAE 52-68 atmospheric test method) particulate filter. The purpose of such a high efficiency final filter is to trap fine "soiling" particulates and even smaller "respirable" particles which can carry adsorbed sulfur dioxide, known as "acid dust." A major advantage of the Purafil system over activated charcoal is the prolonged life of the impregnated pellets, their surface area being renewed as acid gases are oxidized and destroyed.

As Banks researched methods of removing air pollutants, he discovered a scarcity of reliable published data on the effectiveness of any of the available gaseous pollutant removal systems. He advised, therefore, that the performance of the air filtration system be monitored on a continuous basis. Meloy nitrogen oxides and sulfur

dioxide analyzers will soon be installed to sample outside air and air from a supply duct to determine the effectiveness of the Purafil.

A positive air pressure is also maintained in the building to limit the infiltration of and dust and warm air from the adjoining building as the doors are opened and closed.

During the planning process the Library considered two specialized storage areas: one to be maintained at a higher RH for the storage of vellum materials and one to be maintained at a lower RH for the storage of microfilm masters. For economical and practical reasons the storage area for vellum was eliminated. However, a room attached to the service link on one level is supplied by an auxiliary fan unit equipped with a dehumidifier to achieve a RH of 35% rather than 50%. The temperature is maintained at 60°F. All of the Newberry's microfilm masters and service negatives are stored in this room.

The environmental conditions are monitored continuously by a Johnson Controls JC/85/40 building automation system. Electronic sensing devices located on each level of the Bookstack building signal Field Processing Units which interpret and relay the temperature and RH to Distributed Processing Units. These, in turn, process and relay to the Central Processing Unit (CPU) in the Building Control Room. There, a CRT and printer make it possible to call up this information as well as the status of all the individual components of the heating, ventilating and air-conditioning (HVAC) system at any time.

At programmed intervals, a report on the status of designated field points is printed. The CPU currently produces a Trend Log for both temperature and RH storing readings taken at two-hour intervals and printing them out in a specified format every 24 hours. This method of recording temperature and RH has replaced our former method of hygrothermograph rotation throughout stack areas. We regularly check the calibration of the thermostats and humidistats with a psychometer.

The high and low level limits for the temperature and RH have been programmed into the system. If these are exceeded, an alarm is activated at the CRT and, when the Library is closed, on a pager worn by the security personnel on duty 24 hours a day. This alarm will sound until it has been acknowledged at the CRT, thus ensuring that the condition is responded to by a trained staff member. A printout of the alarm condition is produced simultaneously. When the air analyzers are installed they will also be tied into the JC/85/40 to signal alarms and provide permanent records.

The Bookstack building has no fire suppression system (with one exception) relying instead on a high concentration of ionization smoke detectors and fixed-rate/rate-of-rise heat detectors. The exception is the Special Collections Vault, which has a Halon system, a chemical combustion suppressant. For reporting purposes the detectors on each level are divided into quadrants. The alarms they generate report to a Fire Panel in the Building Control Room which indicates the location of the alarm within each level. This early warning detection system,

combined with immediate, trained response, is, we feel, an acceptable alternative to a sprinkler system and eliminates the need for any water in the Bookstack building. While the fire detection system is a stand-alone system with its own auxiliary power source, it does interface with the JC/85/40 to interlock with HVAC functions. For example, if a fire alarm sounds, the computer will automatically shut down the supply-fan units.

For life safety reasons, if an alarm should be activated on any level the alarm system will sound on all levels to evacuate occupants. At the same time, the auxiliary fire doors at the interior side of the entrance vestibule to each level close automatically. These fire-rated doors, combined with fire dampers in the air ducts and the absence of vertical penetration between levels will theoretically contain a fire to one level.

Access to each of the stack levels is controlled by a card access system. Each staff member is issued a card which can be programmed for entry by level, time of day and day of the week. Any attempt at unauthorized entry denies access, generates an alarm condition requiring security staff response, results in a hardcopy printout of the alarm and becomes part of a permanent transaction log. Independent critical security points report to the JC/85/40 but have stand-alone capability and have an auxiliary power source. Perimeter and interior space protection make use of door alarms, motion detection, closed circuit television systems and supplementary locking systems.

This then is the Newberry Library's preservation climate: a building that economically maintains a controlled environment conducive to prolonging the life of library materials; that maximizes the security of its contents by limiting access and reducing the risk of damage caused by fire and water; and that monitors all of its building systems to ensure continuous maintenance of its established environmental standards.

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1. The subsequent (unpublished) "Addendum to Planning Report #7: Preliminary Statement on Environmental Standards for Storage of Books and Manuscripts," dated January 30, 1980 (revised February 12, 1982), updated "PR7" with additional information primarily regarding methods of air filtration. The basic recommended environment standards remained the same, however.

2. It should be noted that this problem exists in the reverse as well--items paged for use must in turn be reshelved. Thus, it becomes necessary to maintain a specific, albeit wider, temperature and RH range within the building that houses the reading rooms.

3. Since the Bookstack building houses no people functions, it has been classified as a "warehouse" by Chicago's city code. One ramification of this classification is that it exempts the Library from installing a sprinkler system. Another is that it reduces the amount of make-up air (fresh air intake) required by city code. This reduces operating costs further by minimizing the percentage of unconditioned air introduced into the ventilation system.

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SELECTING FOR CONSERVATION - SELECTING FOR CONVERSION

SOME PRACTICAL RECOMMENDATIONS FOR POLICY

by Dr. Helmut Bansa

Bavarian State Library
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Meeting 168

It may be argued that it is a bad title that needs to be explained. The word "conservation" in the title of this paper does need an interpretation, because it can have quite different meanings. Used here it should be understood as any practical work, done manually or by machine, aiming at better durability and better usability of a book, manuscript, globe, photo, or any other item in a library. Library objects that are selected for conservation must last for a very long time in their original material form. Regarding books as material objects, the bindings are integral parts of them. In the point of view stressed here this has two consequences: 1) a book without a binding is not a book. Normal binding, done everywhere in libraries without any selection, is not a part of conservation; it precedes conservation. 2) The original binding of a book is an object of conservation as well as its paper. Both the bindings and the paper of books that are selected for conservation must last for a very long time in their original material form. Conservation in this sense can be restoration: restoring to a book, a manuscript, etc., its physical strength, if it has been lost, and the undamaged material status the item needs if it is to be used. In practice, in the daily work of the library staff specially engaged in conservation, both craftsmen and managers, the priority is just the reverse: there are so many books that have just lost their physical strength, so many books that must be

restored that there is no time to treat non-damaged ones. As far as I know there are only two libraries in the world doing some practical work in the sense defined above on non-damaged books. In all others, restoration is performed, and this includes conservation. We could call this kind of work "active conservation." "Passive conservation," in contrast, would be apt storage under suitable environmental conditions, handling with care, and all other activities that can be defined as obvious good housekeeping for any library. I do know that it is not being done! But I will not stress this problem here. In any event, there must not be selection for passive conservation; there must be selection for active conservation, the more so because, normally, selection for restoration includes active conservation.

To clarify why there must be selection and how serious it must be, we must understand what this kind of work really is. For this short survey it is better to exclude binding activities. That is the domain of craftsmanship, covering the whole field from simple cleaning and dressing to imitating any technique that has been used for books over the centuries and using all of its materials. Here we will look only at book paper. If this paper has lost its physical strength, it must resist the force of the reader`s hand turning the pages; no other treatment than sheet-by-sheet treatment is possible. If the loss is only slight, the paper can be bathed in a film-forming solution

or sprayed with such a solution. If the proper apparatus is used, this will take only a few seconds per sheet; for a book - only one book - the seconds will add up to an hour or more, and for all the books in a library needing this procedure, it will amount to many years. There is one conservation (restoration) method, newly invented and not really in practice yet, that does not use a film-forming agent but changes the molecular structure of the cellulose such that the paper consisting of this cellulose will regain a part of its lost strength. This new method, the development of which cost several hundred-thousand dollars, requires sheet-by-sheet treatment as do all the others. Paper in a more serious state of decay must be combined with another product and leaf-cast, sheet-by-sheet. No other treatment is conceivable. Done by the most skillful specialists using the best apparatus, this takes several minutes per sheet, days for a book, and centuries for a library. This is an expense beyond reality. There must be a selection.

For any book that is not selected for restoration there is the risk that one day it will be destroyed and lost totally. In a national library, a deposit library, a library obliged to preserve the cultural heritage insofar as it is stored in books from the past, the present, and in the future this cannot be tolerated. The criteria of selection may change; a book neglected in our time as not worthy of restoration

may achieve the highest esteem in the mind of succeeding generations; it may be the object of a revised selection in the future. Total loss must be avoided. To solve this contradiction the manager responsible for conservation must bear in mind a very important principle: passive conservation - definition above - presupposing that a book will not be lost solely because it is regarded as unsuitable material. Even paper of worst durability will not crumble to dust solely because it is in storage. Parts of it will crumble if the book is used. The result is the principle that endangered books not selected for conservation must be withdrawn from use, most probably in their original material form. Because it is impossible to conserve them in their original material form their content, the information stored in the material threatened by loss and therefore to be withdrawn from handling, must be converted to another format that will tolerate handling. In the library practice of today, the book must be microfilmed.

This microfilming, this conversion treatment, must be done sheet-by-sheet just as any other conservation treatment. It is less time-consuming and less expensive, but it is certainly an expense. It is not only impossible to restore/conserve all books endangered by decay and loss, it is also impossible to microfilm them all or to convert them by another technique. In the view stressed here, there is no difference between microfilm and optical disk or any

other conversion technique that can be conceived. There must also be selection for conversion. In other words, there must be selection. A librarian who is not only handling the books, but also concerned with the mechanism of publication and the reasons for an author's and a publisher's activity may think that many of the books he is collecting and cataloging and preserving will never be used, some of them from the beginning and more of them later, after a short period of contemporary intensive use. These numerous books may be withdrawn from use, stored under suitable conditions and await the real or imaginary day when they will be discovered as books of interest and therefore to be converted, or as antiquities of high esteem and therefore to be restored. Let me repeat, we must avoid the loss of even those books of greatest contempt in our time, not to mention the contempt in the personal mind of a librarian. Contempt today may become esteem tomorrow. A librarian who is fully aware of his responsibility for the cultural heritage deposited in books and in other library materials may find different criteria for selection, based on principals of history, philosophy, sociology, etc. Criteria of this kind must be defined as subjective, dependent on the librarian as a person, and the philosophic, historic, or political traditions that he is obliged to. The criteria of selection should be objective ones.

Books and readers are the focal point of library work. To serve a patron fully, one must be guided by the patron's needs. Therefore, it is imperative to select only those books for conservation, restoration, or microfilming that are truly needed by the reader here and now. Tomorrow his needs may be different; however, those needs will be met by our successors. It is techninally feasible and morally acceptable to preserve those not needed here and now only passively. It is simply unavoidable. Therefore, the problem of conservation shifts from technology to management. I would like to share with you the approach taken by the Bavarian State Library, where I am employed.

We follow very strict guidelines and turn over to our readers only those books that are in physically acceptable condition for use. I will not deny that such judgment requires a good deal of training, which at times is still lacking. In another paper that I will be giving at this Congress, I maintain that the solution to problems of conservation in our libraries rests with the proper library know-how and raising the awareness of the library staff. Let us assume that this has already been accomplished and that when a book that is in fragile condition is handed to a reader, it is with the full awareness of the librarian. Almost any books can tolerate one more handling under normal conditions. It should not be difficult to train librarians to recognize the dangers of different types of use, e.g., Xeroxing. This danger can be described by formal and

therefore easily recognizable criteria: hardbound copies, books with tight inner margins, folios, books with brittle edges, etc. may not be Xeroxed in the Bavarian State Library. Special permission from a professional librarian is required for exceptions to these rules. At times it is very difficult to implement these restrictions, especially when a bonafide need exists. Not only must the consciousness of the librarian be raised, but the understanding of the reader as well.

After one more use, which most books can tolerate, the book must be turned over to the librarian responsible for conservation. He then decides which course of action to take. Since he has to examine many books, such an evaluation is by necessity very superficial. He selects only those books which, according to his philosophical, historical, and sociological criteria, that is to say, according to the criteria which he has set for himself, are truly deserving of restoration, because they represent an era, or appear to have potential rare-book value, or are representative of an historical event. Those books judged to possess only transitory value are destined for microfilming. The vast majority of the endangered books are separated merely by sight. They are placed inside protective covers [containers] that serve a dual function: they offer the endangered books additional protection so that the damaged pages of brittle books are not lost, and they distinguish these

books visually from the rest of the collection. This protective container is made of red pressboard. All attempts to limit the size of these containers to established specifications have failed. They must be custom-made. The margin of error may not exceed five millimeters. Contracts for the production of these containers are awarded where adequate need exists. This allows a more cost-effective approach.

The containers are very simply constructed: cut open and laid out flat, they are in the form of a cross lying on its side. The area where the long and short crosspieces intersect, the "crossing," to use architectural terminology, covers the back cover and is the same size. The parts jutting out are scored, and as flaps, are wrapped around the remaining sides to afford total protection. The average cost for such a container ranges from four to five dollars.

The following developments have proved useful. The top and bottom flaps must have ribbons which can be tied in a knot on the inside under the large flap of the front cover; otherwise, there would be the danger of the book slipping out of its cover. The outer knot has to be situated over the front edge and not over the front cover, so that it will not interfere with shelving. Every container has a minimum of four ribbons: one each at the upper and lower flap for tying under the outer flap; and one each at the outer flap and at the back for tying at the front edge, as described. The containers for folios have six ribbons, that is, two

more for the outer protective cover. The ribbons are inserted into the pressboard in the directions of pull while being tied. All books placed inside the red protective containers can no longer be circulated. They are labeled as follows:

> "Due to its brittle conditions, this book may only be used in the Reading Room.
> In case of frequent use, it is to be microfilmed or restored. After each use, please return this book to the restoration laboratory."

Next to this text is a column listing the date of every use. In the restoration laboratory a decision is made by the responsible librarian with regard to the book and its repeated use. This decision depends on the resources available. At the present time, every book that is used twice in three years is microfilmed or restored. If this procedure costs more than the available funds, alternative solutions must be considered.

I hope to collect meaningful data from this procedure, which has only recently been implemented, to convince the library administration that an expansion of the restoration effort is desirable. Statistics are more convincing than are words for administrators who need to realize that more money is needed to prevent permanent loss of our library collections.

As mentioned earlier, any responsible librarian will designate those books for restoration that have rare-book potential. These decisions have to be made very conservatively, however, since great expense is involved. We should not sacrifice quality for quantity.

A real breakthrough in production statistics, as far as restoration is concerned, which reflect the tremendous quantity of damaged and acutely endangered collections in our libraries has not been achieved despite all research efforts going back years and decades. For these two reasons, I am very skeptical of the attempts to mechanize, some even say automate, restoration work.

Restoration is expensive. It is difficult and even risky to make a more exact statement, because the books which have to be restored differ so much in size and degree of damage. One cannot avoid oversimplifications. But I'll take the chance and make the following calculation or simplification: As an example for calculating restoration costs, I have chosen a book of 500 pages in large octavo and a size of 17 x 24 cm.

First example of a damaged book: "pulp paper." Inner margins yellow and brittle, center portion of the pages still intact --restoration possible by adding fiber to the edges in combination with neutralizing and realigning the center of the page. Cost between $300 and $700, without restoration of the book cover.

Second example of a damaged book: "acid paper." All pages are brittle throughout. Restoration through splitting and neutralization. Cost between $500 and $1,200 without restoration of the cover.

Restoration of the cover (and a rare book needs a cover) according to the state of the art, which I do not want to go into here, can cost an additional several hundred dollars.

For the vast majority of books this is much too expensive. Such books are being microfilmed, but, as I said before, only on demand. In this case the red protective container gets another printed label:

"Use microfilm."
"The original cannot be used because of its condition."

The microfilm is recorded in the catalog so that the user looking for the book can find it there. The actual catalog entry lists the restriction and a reference to the microfilm. Should a bock one day be recognized as a rare item, it can easily be identified by its red container and can be restored. If one day a process for mass restoration should be discovered - I don't foresee it - then all these books could be quickly pulled and treated.

Microfilming of books has to be inexpensive and reader-friendly. Therefore, microfiche should be chosen over roll microfilm. It is particularly desirable that a book be contained on one fiche.

This requires that we forget using standard frames, which is no problem technically, because the fiche platform in viewers and enlargers can be adjusted with infinite variety. The more images of book pages (double-pages) one can get on a fiche, the more one has to reduce, but this has limits, set by laws of optics and the quality of the film. Once the reduction factor approaches the number 50, a qualitatively excellent re-enlargement can no longer be guaranteed, especially not for small prints (below 8 pages = 3 mm) and for the weak contrasts often found between print and yellow paper in old books. Factors smaller than 28 do not make sense because the microfiche readers are generally equipped with lenses for 24 and 42 (48) X. The reader does not mind, and often wants reduced pictures on the screen (produced, for example, with factor 31, reproduced with factor 24). Enlarged pictures (produced with factor 19 and reproduced with factor 24, for example) may extend beyond the screen and require positioning of the file which is not good for the fiche either.

From these conditions, plus the fact that a file has a certain size (14 x 9.5 cm usable area, without header) while books come in many sizes, we have different grids, for example, 10 columns, 9 lines; 12 columns, 12 lines; 14/13, and 16/16, for 180, 288, 364 and 508 book pages. Old books may be of any size between 6 x 8 cm and 40 x 50 cm; the proportion of height and width of an open book ranges from 1:1.15 to

1:1.5. The grids listed above allow optimum use of fiche and optimum adjustment to individual books. The type of grid and factors corresponding best to a particular book are decided on an individual basis. The factor is recorded in the header. This guarantees that the setting in the viewer can be set to correspond exactly to the original size. The header also contains an abbreviated title and the call numbers of a book, as well as an indication of how many files are involved and a numbering: 1/3, 2/3, 3/3.

If copies are to be made from microfiche, it is desirable to produce the copies when the fiche is made. One copy may be purchased by the reader; a second copy can be loaned to other libraries or can be used for transfer to optical disc, the storage medium of the future. In this case, the original will not have to be photographed again.

At present microfiche meets all the needs of a library. It is hoped that the method of selection described will, in due time, establish a collection from which most of the demands of readers for books that are endangered and damaged can be satisfied, especially if this method is supplemented by another which is no less pragmatic and reader-oriented. The preparation of fiche for books for which there is a demand could be done by a publisher. A library should make sure that after a set time during which the publisher can recover his cost and make a profit, the master be returned to the library for storage and conservation. At present the

Bavarian State Library is considering this possibility with several publishers. The commercially-produced fiche should not differ in quality from those prepared in-house. As for cataloging, remarks similar to those stated earlier could be made on the protective container of the original book, indicating duplication, enlargement, etc.

A final comment: We have discussed microfiche duplicates which can be transferred to other libraries that have the same book in the same state of deterioration and in need of microfilming. Sooner or later, depending on storage conditions and use, all copies of a book printed on acid or pulp paper will deteriorate. The creation of an international register of microfilm masters could lead to effective and meaningful international cooperation between all libraries.